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CUSTOMER NO: 36038  
In the United States Patent & Trademark Office

Docket No. PARSE-C4

Applicants: M. Seul et al.

Examiner: P. Do  
Art Unit: 1641

Serial No.: 10/624,020

Confirmation No. 5081

Filed: 7/21/2003

For: Chips in Fluid Confinement Regions

I hereby certify that, on the date indicated below, this correspondence was sent by fax to the Commissioner for Patents, at (571) 273-8300

By: 

Date: 10/13/06

### Brief on Appeal

Dear Sir:

On appeal from the Final Rejection of 10/10/2006, please review the rejections in view of the following arguments. Please charge the fee of \$250 for the filing of this Brief to Deposit Account No. 502088.

#### Real Parties in Interest.

The assignee of this application is BioArray Solutions Ltd. of Warren, New Jersey.

#### Related Appeals and Interferences.

None

#### Status of Claims.

Claims 1 – 46, 48 and 51-54 have been canceled.

Claims 747, 49, 50 and 55 are pending and have been rejected.

#### Status of Amendments

The amendments filed on July 13, 2006 have been entered.

#### Summary of Claimed Subject Matter

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Independent claim 47 relates to a substantially planar substrate having a (silicon) chip disposed on it for use as part of a biological assay system. See Fig. 25A and page 64, line 23 et seq. Several discrete hydrophilic regions are part of a planar surface of the substrate, the hydrophilic regions being separated from other hydrophilic regions by a hydrophobic region which is part of said planar surface, the hydrophilic regions being designed to accommodate the chip disposed thereon. See page 34, lines 15 et seq. and page 64, line 23 et seq. The chip has a hydrophilic surface which faces the planar surface of the substrate when the chip is disposed on the substrate. Note: Silicon, which the chip is made of, is a hydrophilic material, see below. The chip also has a surface opposed thereto with an array of particles deposited thereon, and a biological reagent is bound to the particles. See Fig. 25B and 25C; and page 65, first few lines et seq. The array of particles could be encoded particles bound to biomolecules (as shown in Figs. 25A to 25C) for use in multiplexed biological assays, where analytes bind to particular biomolecules (which biomolecules are bound to the encoded particles, different biomolecules being bound to differently-encoded particles), and the analytes are then identified by decoding those particles associated with bound analytes.

#### **Grounds of Rejection to Be Reviewed on Appeal**

Whether claims 47, 49, 50 and 55 were properly rejected for failure to comply with the description requirement of 35 USC § 112, para. 1.

Whether claims 47, 49, 50 and 55 were properly rejected under 35 USC § 112, para. 2.

Whether claims 47, 49, 50 and 55 were properly rejected for failure to comply with the description requirement of 35 USC § 112, para. 1.

Whether claims 47, 49, 50 and 55 are obvious under 35 USC § 103(a) over Rava et al. in view of Shivashankar et al.

#### **Argument**

A. Claims 47, 49, 50 and 55 Comply with the Description Requirement of 35 USC § 112, para. 1

The Examiner rejected the claims because of the recitation in claim 47 that "the chip has a hydrophilic surface ..." Silicon, which the chip is made of, is a hydrophilic material, as stated, for example, in the the on-line publication "Science and Technology" put out by the Lawrence Livermore Laboratory:

Silicon carbide is made of alternate layers of carbon and silicon atoms. Consequently, the material has two possible surfaces with quite different electronic and structural properties. These properties have a strong effect on the material's relationship with water. In particular, surfaces rich in carbon atoms have a hydrophobic (water-repelling) character, **while surfaces rich in silicon atoms are strongly hydrophilic** (water-binding). [January/February 2006 issue: "Simulating Materials for Nanostructural Design" (see <http://www.llnl.gov/str/JanFeb06>)]

Accordingly, silicon, and its surfaces, are inherently hydrophilic, and the rejection should be reversed.

B. Claims 47, 49, 50 and 55 Comply with the Requirements of 35 USC § 112, para. 2

The Examiner has stated that claim 47 is indefinite because it recites that "the hydrophilic regions [of the substrate] accommodate the chip disposed thereon." This language does particularly point out and claim what Applicants regard as their invention, and the rejection should be withdrawn.

C. The Subject Matter of Claims 47, 49, 50 and 55 Is Nonobvious within the Meaning of 35 USC § 103(a)

Regarding the rejection under Section 103(a) over Rava et al. in view of Shivashankar et al., the relevant portion of Rava et al. (col. 8, lines 35 et. seq) provides:

In another embodiment, the biological chip plate has a wafer having a plurality of probe arrays and a material resistant to the flow of a liquid sample that surrounds each probe array. For example, in an embodiment useful for testing aqueous-based samples, the wafer can be scored with waxes, tapes or other hydrophobic materials in the spaces between the arrays, forming cells that act as test wells. The cells thus contain liquid applied to an array by resisting spillage over the barrier and into another cell. If the sample contains a non-aqueous solvent, such as an alcohol, the material is selected to be resistant to corrosion by the solvent.

As is clear from Col. 4, lines 24-30 of Rava et al., the "hydrophobic materials" referred to in the quoted section above are a raised "physical barrier" on the surface of the array, such that "an array of biological chips in which the probe array of each chip is separated from the probe array of other chips by a physical barrier resistant to the passage of liquids and forming an area or space, referred to as a 'test well...'" In contrast, in the claimed invention, the "hydrophilic regions [are] separated from other hydrophilic regions by a hydrophobic region *which is part of said planar surface ...*" The hydrophobic regions are not raised with respect to the substrate surface, as is described in Rava et al. Rather, due to their hydrophobicity, the hydrophobic regions act to separate fluid associated with chips from other chips on the planar surface. As Rava is directed to forming "test wells," (see Col. 4, lines 24-30) there is no suggestion of having the hydrophobic region as part of the planar surface of the substrate.

Rava et al. also do not disclose or suggest the claimed: "several discrete hydrophilic regions which are part of a planar surface of the substrate ..." The Examiner contends that Rava et al.'s test wells "comprise hydrophilic regions because they can accommodate aqueous sample..." Because the hydrophilic regions in the claimed invention act to hold the chip in place, and Rava does so by placing the chip in a test well (formed by raising a barrier in the embodiment discussed above), there is no suggestion of such discrete hydrophilic regions "which are part of a planar surface of the substrate ..." in Rava et al.

The Examiner notes that Shivashankar et al. "teaches grafting an array of particles coated with ... a biomolecule, on to localized positions of a semiconductor substrate (biochip)." Shivashankar et al. does not disclose the claim elements missing in Rava et al., i.e., hydrophilic or hydrophobic regions which are part of a planar surface of the substrate. The rejection should be reversed.

In conclusion, reversal of all rejections is respectfully sought.

Respectfully Submitted,

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The Commissioner is hereby authorized to charge any fees due in connection with this submission and not otherwise covered by payment included herewith, or to credit any overpayment, to Deposit Account No. 502088.

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**Claims Appendix**

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1-46 (canceled)

47. A substantially planar substrate and a chip disposed thereon, which together form part of a biological assay system comprising:

several discrete hydrophilic regions which are part of a planar surface of the substrate, the hydrophilic regions being separated from other hydrophilic regions by a hydrophobic region which is part of said planar surface, wherein the hydrophilic regions are designed to accommodate the chip disposed thereon, the chip having a hydrophilic surface which faces said planar surface when the chip is disposed on the substrate and a surface opposed thereto with an array of particles deposited thereon, and wherein a biological reagent is bound to the particles.

49. The substrate of claim 47 wherein the hydrophilic regions are within the perimeter of indentations in the planar surface of the substrate, said indentations being surrounded by the hydrophobic regions.

50. The substrate of claim 47 wherein said array includes different types of particles having different biological reagents bound thereto.

55. The substrate of claim 47 wherein the substrate comprises silicon or doped silicon.

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Evidence Appendix

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None

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Related proceedings Appendix

None